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L21 not (gps\$ or satellite\$).clm.	13

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IBM Technical Disclosure Bulletins

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DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES;
OP=OR

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DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; THES=ASSIGNEE; PLUR=YES;
OP=OR

	(4933864 5350033 6012002 6101951 5942853 5321614 5155684 5523951 4700427 5111401 5072154 4930742 5943009 4667203 4727290 4847769 6240368 5925080 5995884 5796094 5166688 5614788 5214757 5163273 5182502 5613261 5554914 5883861 5109566 4161793 5377551 6329925 5007234 5988306 5382957 4772832 4402158 5613196 4572530 5715093 5440216 5759083 4665321 5051906 6212393 5438517 5942869 3952361 4443968 4682165 4692798 4599544 4811228 4021725 4919224 3480092 5187383 5622236 5537003 5291412 5592382 5293955 5850884 5841126 5426294 6097023 3699316 5202829 4677562 4595843 4575304 4967319 4599620 6212476 5473364 5991615 5974347 5904196 5508592 5877897 5276618 5344144 5132695 6144158 4993912 4236099 5235178 5416318 5390124 5177489 5390125 5384574 4974687 5917442 4962453 5155490 5808907	
<u>L15</u>	5442558 5279672 5517419 5986583 5493694 5006672 5451014 5838562 3789351 5043902 4878170 5241380 5311950 4899945 4639610 5990469 5379320 5299130 3952813 5666028 0367420 5422814 4133404 3963096 5220263 4782550 5603383 5329206 4992696 6330499 5940927 5606506 6049171 5749058 5323322 5272639 5596255 5030957 4694639 5012886 5662180 5347286 4727329 5124549 4949268 5341540 5444965 4376909 5434407 4702718 5506506 4139801 5837994 5903124 3088157 5451822 5719771 5551545 5150712 4306329 3865200 5375059 4862037 5438337 5721691 5550677 4515235 4890233 5014066 2770074 6130421 4768135 4920095 6076226 5086253 5934386 5274329 5919078 5143073 5923027 5815071 4939444 5452639 5325302 5912534 5660454 5570285 5075693 4796191 4913458 4926127 4924450 5093839 4674048 5894621 5420593 2827594 5787545 5835613 5610488 2632040 6166698 5576605 4860018)[PN]	419 <u>L15</u>
<u>L14</u>	('5719500' '6459955' '6548982' '6488105' '5928309' '6611755' '5374914' '6587573' '6454036' '2062719')[ABPN1,NRPN,PN,TBAN,WKU]	28 <u>L14</u>
<u>L13</u>	('5719500' '6459955' '6548982' '6488105' '5928309' '6611755' '6321515' '5374914' '6587573' '6454036' '2062719')[URPN]	92 <u>L13</u>
<u>L12</u>	L10 or l6	11 <u>L12</u>
<u>L11</u>	L10 and thread\$	0 <u>L11</u>
<u>L10</u>	L7 and (lawn\$ with mow\$)	6 <u>L10</u>
<u>L9</u>	L8 and (lawn\$ with mow\$)	0 <u>L9</u>
<u>L8</u>	L7 and thread\$	5 <u>L8</u>
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<u>L6</u>	l3 or L5	5 <u>L6</u>
<u>L5</u>	L4 and thread\$	1 <u>L5</u>
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Search Results - Record(s) 1 through 6 of 6 returned.

☐ 1. Document ID: US 6459955 B1

Using default format because multiple data bases are involved.

L10: Entry 1 of 6

File: USPT

Oct 1, 2002

US-PAT-NO: 6459955

DOCUMENT-IDENTIFIER: US 6459955 B1

TITLE: Home cleaning robot

DATE-ISSUED: October 1, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bartsch; Eric Richard	Cincinnati	OH		
Fisher; Charles William	Loveland	OH		
France; Paul Amaat	West Chester	OH		
Kirkpatrick; James Frederick	Milford	OH		
Heaton; Gary Gordon	Cincinnati	OH		
Hortel; Thomas Charles	Cincinnati	OH		
Radomyselski; Arseni Velerevich	Hamilton	OH		
Stigall; James Randy	Hebron	KY		

US-CL-CURRENT: 700/245; 318/568.11, 318/568.12, 318/568.16, 318/587, 342/418,
342/457, 700/247, 700/256, 700/258, 700/259

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMIC	Draw De
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☐ 2. Document ID: US 6454036 B1

L10: Entry 2 of 6

File: USPT

Sep 24, 2002

US-PAT-NO: 6454036

DOCUMENT-IDENTIFIER: US 6454036 B1

TITLE: Autonomous vehicle navigation system and method

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMIC	Draw De
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☐ 3. Document ID: US 6321515 B1

L10: Entry 3 of 6

File: USPT

Nov 27, 2001

US-PAT-NO: 6321515

DOCUMENT-IDENTIFIER: US 6321515 B1

TITLE: Self-propelled lawn mower

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 4. Document ID: US 5928309 A

L10: Entry 4 of 6

File: USPT

Jul 27, 1999

US-PAT-NO: 5928309

DOCUMENT-IDENTIFIER: US 5928309 A

TITLE: Navigation/guidance system for a land-based vehicle

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 5. Document ID: US 5719500 A

L10: Entry 5 of 6

File: USPT

Feb 17, 1998

US-PAT-NO: 5719500

DOCUMENT-IDENTIFIER: US 5719500 A

TITLE: Process for detecting metallic items including a search path defined by a linear movement with a superimposed rotational movement along a curved closed path

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 6. Document ID: US 5374914 A

L10: Entry 6 of 6

File: USPT

Dec 20, 1994

US-PAT-NO: 5374914

DOCUMENT-IDENTIFIER: US 5374914 A

TITLE: Compact magnetic energy storage module

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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L22: Entry 8 of 13

File: USPT

Aug 29, 1995

DOCUMENT-IDENTIFIER: US 5444965 A

TITLE: Continuous and autonomous mowing system

Detailed Description Text (44):

The operation of the motor with electronic commutator can nevertheless cause very sudden magnetic field variations which are difficult to eliminate. This can disturb the operation of the limit detector (8) described above.

Detailed Description Text (47):

As indicated in FIG. 6, the control of the mowing device is effected with the assistance of an electronic circuit control comprising a micro-controller 102 with the mowing device management program in memory. Furthermore are illustrated an energy control device in 103, control of the motors in 104, photovoltaic cells in 105 and a battery in 106.

Detailed Description Text (107):

According to the invention, it is in fact possible to adopt a `mapping` system allowing the device to memorize the limits of the surface to be mowed, the zones already mowed and for each surface unit previously mowed the cutting force on the aforesaid unit. This allows the device subsequently to optimize the mowing route by repassing more often over the zones where the grass grows more rapidly.

Detailed Description Text (108):

For each surface unit the `mapping` assigns a memory point with a parameter `cutting force-limit obstacle` which enables it to prepare a map of the surface to be covered. The device can find its way around by obtaining a previous working knowledge of the obstacles on the plot of land. This technique is in itself known. Knowledge of the speed of each driving wheel in fact tells it the distance and the direction. Positioning or repositioning systems can also be devised by precise and periodic localization of generators (optical, ultrasonic or high frequency e.g.) disposed on the plot of land.

CLAIMS:

1. Autonomous lawn mower, with electric motors, comprising at least one driving wheel, a cutting system, an electronic operating and control system for operating and controlling said electric motors associated with said at least one driving wheel and said cutting system, a rechargeable battery and/or photovoltaic cells to supply energy for said electric motors and for said operating and control system, the total power utilized by said motors being less than 120 Watts and a microprocessor and means for detecting obstacles on, and/or limits of, a lawn surface being provided, said detecting means supplying relevant environmental information to said microprocessor; an algorithm stored in the memory of the microprocessor, the electronic operating and control system operating the lawn mower according to the responses to obstacles on, and/or limits of, the aforesaid surface supplied by the detector means and the algorithm, the algorithm maintaining the mower continuously either in operation, or in state of waiting for sunshine or recharging the rechargeable battery, the operation depending upon the state of charge of the rechargeable battery and/or the sunshine.



L22: Entry 9 of 13

File: USPT

May 5, 1992

DOCUMENT-IDENTIFIER: US 5109566 A

TITLE: Self-running cleaning apparatus

Abstract Text (1):

A zone of a floor to be cleaned is subdivided into a plurality of blocks, the position of each block is memorized in a memory of a self-running cleaning apparatus, and the status of each block such that a wall or an obstacle is placed on the block or the block is passed by the cleaning apparatus thereon is also memorized in the memory. The cleaning apparatus moves across the blocks having neither wall nor obstacle thereon and which have not been passed by the cleaning apparatus on the basis of a predetermined priority order in running direction.

Brief Summary Text (11):

Furthermore, in the conventional self-running cleaning apparatus, the program and data for driving a cleaning path must be designed beforehand and stored in the memory of the apparatus. Also the conventional self-running cleaning apparatus cannot be used for cleaning desired spots which have not been stored in the memory by a user.

Brief Summary Text (22):

memory means for memorizing data of the information of the room,

Detailed Description Text (12):

A status sensor 34 is installed in the air path changing device 10, and thereby the status of the hose connector cover 13 is detected. A search coil 100 is disposed on a rear side part of the main body 1, and thereby a magnetic field generated by the inductive means 102 which is provided in a charger 101 installed apart from the main body 1 is detected. A coil 103 which is mounted in the main body 1 is for receiving electric power from the inductive means 102 through magnetic field, so that the received electric power is used for charging an electric power source e.g. nickel cadmium batteries 36, 36 of the cleaning apparatus.

Detailed Description Text (16):

An integrating circuit 51 to which an output signal from the direction sensor 26 is input is connected to the bus line 45 through an input port 50. A memory 52 for memorizing programs and/or data and a timer 53 are connected to the main processor 40. Predetermined times can be set in the Timer 53. Hence, the cleaning apparatus can be set to begin operating automatically at each predetermined time. Two batteries 36, 36 supply an electric powers to the above-mentioned control system. The batteries 36, 36 are automatically charged when a voltage which is higher than the output voltage of any one of the battery 36 is induced in the induction coil 103.

Detailed Description Text (19):

A block-map of a room R1, as shown in FIG. 6, comprises a plurality of squares which divide the room R1 lengthwise and crosswise. A block-map is represented by positional data of each square (hereinafter is referred to as a block), and the positional data is stored in advance in a memory 52 of the cleaning apparatus as shown in FIG. 5. The main body 1 moves on the block-map in a manner which is determined in a predetermined priority order. The priority order in the embodiment,



L22: Entry 10 of 13

File: USPT

Apr 24, 1990

DOCUMENT-IDENTIFIER: US 4919224 A

TITLE: Automatic working vehicular system

Brief Summary Text (5):

By means of memory and reproduction devices to produce signals for controlling the route, U.S. Pat. No. 3,840,086 discloses the use of recording tapes for route record and control. Republic of China Patent Application No. 7410043 employs a pen mounted upon a paper reel device for making a route record which then is read by a photoelectric cell in order for a servo-control to reproduce the route. However, such methods are based on preset procedures to control the machine's course of travel. Therefore, circumstances such as an incorrect starting position or direction, wheel slippage during travel, or touching an obstacle, will cause a deviation from the preset route and potential injury. Thus, the routing method with an open-loop control is deemed impractical.

Brief Summary Text (6):

The machine according to U.S. Pat. No. 4,180,964 comprises a metal wire (band) laid in a desired path as a conductor for controlling the pendulous position of a magnet on the lawn mower. Using electrical contact points and relevant mechanisms to correct its direction, the lawn mower moves along the wire. This technique is well-known and used in automation plants. Current in the wire generates an alternating magnetic field which induces the coils on the automatic vehicle to control the vehicle's movement. However, if this control method is used to control an entire lawn mowing route, a wire must be laid along the entire lawn mowing route, and obviously, it also is not practical.

Detailed Description Text (2):

FIG. 1A shows the vehicle M of this invention. An electric power source 1 comprises an accumulator, a power supply and a charge circuit for storing and supplying the required power. A dynamic source 2 (a motor or an engine) is used to drive a travelling mechanism 4. Microcomputer 3 controls, via stored operational programs, the operation of the peripheral devices and commands specific procedures according to signals received from sensors (described in more detail later). For example, microcomputer 3 controls the travelling mechanism 4 to move forward, backward, and turn. An operation display panel 31 displays necessary operational information and, in addition, enables manual and automatic vehicle operations to be set and adjusted. One such operation which requires setting is the start time of the vehicle. According to this preset time (either a date or a periodic time), a timer 32 generates a signal to start a main switch of the vehicle. Timer 32 has an independent power supply, enabling it to measure time while the vehicle is parked and off. Emergency stop switches 33 (push-button and touch switches located throughout the vehicle) temporarily stop the vehicle in an emergency and can reset the vehicle following the emergency. Wire sensor 5 comprises several groups of coils mounted in front and rear ends of a machine body for sensing the alternating magnetic field of current wires paved on the ground in order to detect the location of the wires as the control data of the travelling route of the vehicle M. An ultrasonic distance measuring device 6 comprises several groups of supersonic transmission and reception units with calculating circuits for measuring the distance between the surrounding obstacles and the vehicle M, to detect the surrounding conditions during travelling. A margin sensor 7, having several

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L22: Entry 11 of 13

File: USPT

Jun 16, 1987

DOCUMENT-IDENTIFIER: US 4674048 A

TITLE: Multiple robot control system using grid coordinate system for tracking and completing travel over a mapped region containing obstructions

Brief Summary Text (3):

A mobile robot designed for unmanned movement is sometimes used for cleaning the floors of buildings. Such a robot may be equipped with a vacuum cleaner and/or sweepers to clean a range of a floor which it travels. Prior art system proposed for controlling the travel of the mobile robot includes one which lays guide cables along a predetermined path of travel of the robot so as to generate an electromagnetic wave. The robot will be guided by the cables while sensing the magnetic field by means of a sensor. Another prior art control system uses optical marks or tapes which are located along the path of travel so that the robot may follow the path sensing the marks or tapes.

Detailed Description Text (4):

The control circuit 6 comprises a central operational circuitry (CPU) 9, and a storage 10 made up of a read only memory (ROM) and a random access memory (RAM). The control circuit 6 further comprises an oscillator 11A for generating clock pulses, and an interrupt controller 11B. As will be described, the CPU 9 delivers a drive signal to a drive circuit 12 via an I/O port 8C in order to reversibly control the rotation of drive motors (servo motors or stepping motors) 13 and 14, which are respectively associated with right and left drive wheels of the robot. At the same time, the control 6 controls the rotation of a drive motor 15 for cleaning sweepers which are mounted on the robot. A control console 16 is accessible for selectively turning on and off a system power source, switching a running mode, setting a start position, adjusting a sensitivity of the direction sensor 2, etc. In order to teach the robot a boundary of a travel range assigned thereto, a command may be applied to the drive 12 by interruption with priority on a radio control basis. This is effected by a remotecontrol transmit unit 17 and a receive unit 18. The outputs of the control console 16 and remotecontrol receive unit 18 are routed also to the control circuit 6 via an I/O port 8B.

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L22: Entry 12 of 13

File: USPT

Sep 4, 1984

DOCUMENT-IDENTIFIER: US 4470119 A

TITLE: Mobile navigator

Abstract Text (1):

A mobile navigator comprises a distance detector for generating a running distance signal, an azimuth detector for generating a progression azimuth detecting signal, a CRT display for indicating the current position of an automotive vehicle, a microcomputer for calculating the current position of the vehicle from the distance detecting signal and the progression azimuth detecting signal and supplying the current position signal to the display, and a memory in which is stored a plurality of map data, earth's magnetic field declination information different for each area in association with the map data, and earth's magnetic field strength information.

Brief Summary Text (3):

In this navigator, however, a signal from the azimuth sensor is deviated a different declination for each area (for example, in a certain area of Aichiken, Japan the declination is 6.5.degree., and in some area of Hokkaido, Japan it is 9.degree.), and therefore the current position of vehicle on a road map will be deviated by the corresponding amount. In addition, the signal from the azimuth sensor is difficult to be distinguished from an external disturbance at a fixed-gain amplifier because of different earth's magnetic field strength (horizontal component) for each area (for example, in Aichiken, Japan the field strength is 310 m gauss, in Hokkaido, Japan it is 260 m gauss, and in a certain area of the middle west district of USA it is 150 m gauss).

Brief Summary Text (4):

Accordingly, it is an object of this invention to provide a mobile navigator in which a plurality of map data and earth's information different for each area in association with the plurality of map data are stored in storage means, a particular map data is read from this storage means and displayed on display means as a road map of a particular area, earth's magnetic field information associated with the particular-area road map read from the storage means, the current position of a running vehicle is calculated from the earth's magnetic field, a progression azimuth detected by an azimuth detecting means, a running distance detected by a distance detecting means, and the calculated current position is displayed on the display means to be superimposed upon the road map displayed on the display means, so that the current position of the vehicle can be correctly displayed on a road map by taking the earth's magnetic field information for each area into consideration.

Detailed Description Text (1):

An embodiment of this invention will hereinafter be described with reference to the drawings. FIG. 1 shows the whole arrangement of one embodiment of this invention. Referring to FIG. 1, there is shown a direction detector 1 which as a direction sensor for detecting the X- and Y-component of the earth's magnetic field in accordance with the direction in which a vehicle progresses, and an A/D converter for converting an analog signal from the sensor to a digital signal. Thus, this direction detector 1 generates a digital signal of X- and Y-component according to the progression direction of vehicle. Shown at 2 is a distance sensor, which generates a distance pulse each time the vehicle progresses a unit distance (for

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L22: Entry 13 of 13

File: DWPI

Nov 21, 1985

DERWENT-ACC-NO: 1985-297545

DERWENT-WEEK: 198548

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TITLE: Navigating system for self-propelled vehicle - measuring distance travelled and direction with display unit and memory storing point information including position

Basic Abstract Text (1):

The system has a control specifying the geographic description of a starting point and a destination point for reading position information from the memory and for receiving signals from the distance and direction sensors to calculate the present position of the vehicle and to calculate the coordinates of the starting point, the destination point and the present position.

Basic Abstract Text (2):

The control controls the display so to show marks showing the points on a reduced scale. The memory stores the declination of the earth's magnetic field at numerous points and takes these figures into account to correct the measured direction of travel.

Patent Family Serial Number (3):

4677562

Equivalent Abstract Text (1):

The automotive navigation system has a memory that stores geographical names and the geographical positions of points as well as the declination of the earth magnetism of the points. When the geographical names of a departure point and a destination point are entered through an input unit, a control circuit reads out from the memory the respective positions of the points entered. The control circuit controls a display unit to display on a screen marks respectively indicating the departure point, the destination point, and the current position of a vehicle on an adequately reduced scale determined by the positions of these points.

Equivalent Abstract Text (2):

A point nearest to the current position of the vehicle while the vehicle is being driven is determined and retrieved by the control circuit from the memory storage means. On the basis of the declination information of this retrieved point, the detected vehicle heading direction is corrected to make an accurate computation of the current position of the vehicle.

Equivalent Abstract Text (3):

ADVANTAGE - Performs full navigation function with small memory and arithmetic unit. (19pp)

Standard Title Terms (1):

NAVIGATION SYSTEM SELF PROPEL VEHICLE MEASURE DISTANCE TRAVEL DIRECTION DISPLAY UNIT MEMORY STORAGE POINT INFORMATION POSITION

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L10: Entry 1 of 6

File: USPT

Oct 1, 2002

US-PAT-NO: 6459955

DOCUMENT-IDENTIFIER: US 6459955 B1

TITLE: Home cleaning robot

DATE-ISSUED: October 1, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Bartsch; Eric Richard	Cincinnati	OH		
Fisher; Charles William	Loveland	OH		
France; Paul Amaat	West Chester	OH		
Kirkpatrick; James Frederick	Milford	OH		
Heaton; Gary Gordon	Cincinnati	OH		
Hortel; Thomas Charles	Cincinnati	OH		
Radomyselski; Arseni Velerevich	Hamilton	OH		
Stigall; James Randy	Hebron	KY		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
The Procter & Gamble Company	Cincinnati	OH			02

APPL-NO: 09/715307 [PALM]

DATE FILED: November 17, 2000

PARENT-CASE:

This application claims benefit of provisional application No. 60/166,237 filed Nov. 18, 1999.

INT-CL-ISSUED: [07] G06 F 19/00

US-CL-ISSUED: 700/245; 700/247, 700/256, 700/258, 700/259, 318/568.11, 318/568.12, 318/568.16, 318/587, 342/457, 342/418

US-CL-CURRENT: 700/245; 318/568.11, 318/568.12, 318/568.16, 318/587, 342/418, 342/457, 700/247, 700/256, 700/258, 700/259

FIELD-OF-CLASSIFICATION-SEARCH: 700/245, 700/247, 700/256, 700/259, 700/79, 700/83, 700/258, 318/587, 318/568.11, 318/568.16, 318/568.12, 701/22, 701/23, 701/25, 701/24, 701/206, 701/207, 701/225, 701/300, 701/26, 701/28, 701/217, 701/223, 342/457, 342/418, 180/167, 180/169, 340/990, 340/991, 340/995, 215/319
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

<input type="checkbox"/>	<u>5636402</u>	June 1997	Kubo et al.	
<input type="checkbox"/>	<u>5749058</u>	May 1998	Hashimoto	318/568.11
<input type="checkbox"/>	<u>5787545</u>	August 1998	Colens	
<input type="checkbox"/>	<u>5815880</u>	October 1998	Nakanishi	
<input type="checkbox"/>	<u>5883861</u>	March 1999	Moser et al.	
<input type="checkbox"/>	<u>5894621</u>	April 1999	Kubo	
<input type="checkbox"/>	<u>5903124</u>	May 1999	Kawakami	
<input type="checkbox"/>	<u>5904196</u>	May 1999	Wickers	
<input type="checkbox"/>	<u>5917442</u>	June 1999	Manoogian	
<input type="checkbox"/>	<u>5919078</u>	July 1999	Cassidy	
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<input type="checkbox"/>	<u>5942869</u>	August 1999	Katou et al.	
<input type="checkbox"/>	<u>5943009</u>	August 1999	Abbott	
<input type="checkbox"/>	<u>5974347</u>	October 1999	Nelson	
<input type="checkbox"/>	<u>5988306</u>	November 1999	Ooishi	
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<input type="checkbox"/>	<u>6338013</u>	January 2002	Ruffner	701/23

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2324047	April 1977	FR	
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ART-UNIT: 3661

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ABSTRACT:

An autonomously movable cleaning robot comprising a platform and motive force to autonomously move the robot on a substantially horizontal surface having boundaries. The robot further has a computer processing unit for storing, receiving and transmitting data, and a cleaning implement operatively associated with the robot. The robot receives input data from an external source. The external source may be physical manipulation of the robot, remote control, or by triangulation from at least three external transmitters.

9 Claims, 28 Drawing figures

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